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DISMOUNTABLE PREFABRICATED STRUCTURE, NOTABLY DWELLING, AND
A PROCESS FOR ITS MANUFACTURE

The object of the invention is a dismountable prefabricated structure, notably a dwelling, having prefabricated sandwich panels, posts and crosspieces, all these elements being modular, and a process for its manufacture.

Many prefabricated structures having, for example, sandwich panels, posts and crosspieces are known:

- In the patent DE 19807914, a prefabricated sandwich element for building
- 10 construction is described. This element is formed of two plates constituting its exterior faces between which is cast a light concrete, with density included between 360 kg/m³ and 790 kg/m³. The building is constructed with elements having the height of one story, consequently these elements are too heavy to be handled without hoisting gear. These elements are placed one next to the other with the vertical elements placed between them.
- 15 The stability of the structure is ensured by the fact that the elements are screwed to the posts. The purpose of this invention is to save time when erecting the building.

In the patent US 3203145, a modular prefabricated house is described. By modular is meant the fact of having a set of elements having standard dimensions making it possible to construct various buildings. In this document, the house is made of a steel frame on

20 which sandwich panels are fixed. This structure also requires the intervention of specialists using hoisting gear, notably for erecting the framework.

In the patent US 4852310, a structure with insulation means is described made with prefabricated sandwich panels. This structure is not designed to be dismantled and is complicated enough to require the intervention of specialists.

In all the prefabricated structures known today, specialists must be called upon and hoisting gear used. In no known case is a dismountable modular structure erected by a single man and without hoisting gear described.

Indeed, one of the goals of the invention is to provide a structure made of simple, light elements allowing one man alone to erect it easily, without resorting to hoisting means or complicated assembly means.

Another goal of this invention is to provide a cheap structure which is heat insulated and uses biodegradable materials.

A third goal is to provide a structure with exterior walls allowing humidity to migrate towards the exterior, in other words to provide a structure having walls with a certain porosity by avoiding the use of completely impervious materials, that is non porous materials, which do not make this migration possible, for example perlite dust and fibrous peat sillicate panel waste.

A fourth goal is to provide a structure which has no glue or mortar, which can be mounted and dismounted rapidly without damaging the elements so that it can be used in the case of temporary structures, for example during sporting events, natural catastrophes or in time of war.

These goals are reached with the dismountable prefabricated structure, in accordance with the invention, notably dwellings, having prefabricated sandwich panels, posts and crosspieces, all these elements being modular, characterized in that the sandwich panels are comprised of two rectangular plates with a height included between 0.7 m and 3.5 m made of a base material of hydrosilicate and conifer cellulose having a specific mass equal to or less than 350 kg/m³ and thickness included between 3 cm and 5 cm, maintained separated by two horizontal struts and one vertical strut placed on at least three sides of the plates at a certain distance from their edges in order to constitute an interior

case and an exterior groove on at least three sides of the panel and by a fourth strut either set back from the edge in order to form a groove similar to the other sides or extending in order to constitute a post. This case is filled with an insulating material. The stability of the structure ensured by the crosspieces and/or tie rods under tension maintaining the panels

5 tightly in place. The form of the structure is defined by prefabricated angle parts.

The structure in accordance with the invention provides a structure included between structures made of prefabricated elements such as bricks or cement sections and structures made of heavy prefabricated elements such as prefabricated panels. Indeed, a structure in accordance with the invention has the advantages of both types of structures

10 without the disadvantages. That is it can be built by a single man but much more quickly than structures made of bricks or cement sections and does not require any hoisting gear like heavy prefabricated structures.

The purpose of the invention is also to provide a process for making such a structure, characterized in that a platform is built having a perceptibly smaller surface than

15 the structure. A first angle part is placed on this platform, then two ledgers are placed in the angle part which is fastened to the platform. Then a first post is placed having a height such that it is flush with the bottom of the groove provided in the angle of the angle part as well as two posts of roughly the same height in the spaces foreseen in the angle part.

Finally, two sandwich panels are placed on either side of the angle part in order to enclose

20 the last two posts placed, which will make up the start of two walls. These last operations are repeated in order to constitute a row of posts until another angle of the structure or a post making up the frame of a door or window is met. Then a first crosspiece is placed in the groove provided in the upper part of the sandwich panels making up the first wall and the same thing is done for the second wall, the two crosspieces being assembled using the

25 part provided for this in the post placed in the angle of the angle part. Once the second row

of sandwich panels is placed, the crosspiece is tightened using bolts. All these operations are repeated until the whole structure is finished.

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The invention will be better understood and its characteristics and advantages appear more clearly upon reading the description of the structural shapes given as an example with respect to the drawings on which:

Figure 1 represents a schematic view of an end gable of a structure in accordance with the invention,

Figure 2 represents a schematic view of the framework of the face represented in figure 1,

10 Figure 3a represents a view in perspective of a sandwich element,

Figure 3b represents a view in perspective of another realization of a sandwich element,

Figure 4 represents a schematic view of an angle part,

15 Figure 5 represents the angle part of figure 4 after the crosspieces have been placed,

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Figure 6 represents schematically a series of modular elements.

As may be seen in figure 1, an end gable of a structure in accordance with the invention will have standard rectangular panels 1 whose dimensions in this case are 1 m x 1.25 m and 4 cm thick for the exterior plates 41, 42 represented in figure 3a. Both plates are held apart by the struts 43, 44, made of a hydrosilicate and conifer cellulose base having a specific mass equal to or less than 350 kg/M3 identical to the one of the plates or in wood at a distance of 12 cm. The struts will be set back from the edges at a distance of 6 cm in order to form a groove 46 (see figure 3a) 6 cm deep and 12 cm wide all around the panel. The exterior plates 41, 42 will be, for example, in «THERMOSIL » (registered

trade mark), which is a biodegradable product with hydrosilicate and conifer cellulose base with specific mass less than or equal to 350 kg/m³.

The case made of the plates and struts will be filled with an insulating material 45, for example expanded volcanic sand mortar, for example « PERLITE» (registered trade mark), with « THERMOSIL » granulates. A panel having the dimensions defined above will weigh at most 50 kg, which makes it possible to handle it without using hoisting gear.

In figure 3b is represented a variant of the panel represented in figure 3a, with the same reference signs for the same characteristics. This variant differs from the one in figure 3a by the fact that the panel has three grooves, an upper one, a lower one and a vertical one, the fourth groove being replaced by an element 33a, which will be used as a post once the panel has been placed and will be put into the groove of the adjacent panel.

The face also has angle parts 7, see figures 4 and 5. As may be seen in figure 4, an angle part has a first plate 41 identical to one of the plates making up a standard panel and a second plate 47 of the same height but with a width 4 cm smaller, that is the thickness of the panel. The plate 47 placed parallel to plate 41 at a distance of 12 cm is maintained in this position by the struts 43 in order to create a groove 46 at the end of the panel. At the other end of the panel is placed at a right angle a plate 50 with the same height and width equal to half less 4 cm in the described structural shape of a standard panel. A fourth plate 49 is placed parallel to plate 50 at 12 cm in order to create a panel start with a groove 46. This disposition makes an empty space appear with a square section of 12 cm in the angle.

The structure will be made on a platform 8 previously built of wood or concrete. You start by placing an angle part, for example part 7 as well as a ledger element 21, see figure 2, which will be fastened on the platform using a lag bolt 23. Then the post 28 will be placed in the angle of the angle part and a post 30 in the groove of the angle part. A first standard sandwich panel will be put against the angle part. The height of the posts 28 and

30 is such that, once the posts are placed, the upper part of the posts is flush with the upper groove of the sandwich panels. After this, a post will be placed into groove 46 of the sandwich panel and the operation will be repeated until post 32 is reached, which will have a height equal to one story.

5 The operation described above will be done in the same way on the face (not represented) perpendicular to the end gable represented in figures 1 and 2. When the first row of sandwich panels is placed on both faces, a first crosspiece 26 will be placed in the upper groove of the sandwich panels (see also figure 5) which will rest on the posts 30. The same thing will be done on the perpendicular face (not represented) by placing the crosspiece 25. Both crosspieces 25 and 26 will be screwed together on post 28 using a bolt 10 24 especially provided for this. The bolt 31 will then be placed but not tightened completely but enough to maintain post 32 in place. The same operations will be done in the same way as above, that is post 29 is placed and screwed onto both crosspieces 25, 26 using bolt 24 and a second angle part 9 on the first angle part 7. The sandwich panels 15 separated by posts 33 will be placed. Once all the panels and all the posts are in place, bolt 31 will be tightened, which ensures the stability of this end of the wall. The operation is repeated starting on the right-hand angle in figure 1. Once this second piece of wall is finished, a space between the wall ends remains in which a doorframe 3 will be placed. The width of the space is a multiple of a panel width in the form described 5/4, that is 1.25 20 m. The crosspiece 34 will be tightened by a bolt 35 placed roughly in its middle. Above the door, a panel with width equal to a half panel is placed in the flat position.

The rest of the face will be made in the same way, always placing panels or multiples or sub-multiples of panels, for example panels 4 and 6 surrounding a window 5.

Figure 6 represents in cross section and in layout a set of panels and its sub-multiples as well as an angle part, which in the represented case has two half-panels as a start for the wall.

Even though the preceding description refers to a preferred structural shape for the
5 invention, modifications can be made without departing from the spirit of the invention,
notably concerning the dimensions of the panels, posts and crosspieces surrounding a
window 5.